REMARKS

Applicants appreciate the Examiner's thorough review of the present application, and respectfully request reconsideration in light of the preceding amendments and the following remarks.

Claims 6-23 are pending in the application. Claims 6, 12-13 and 21 have been amended. No new matter has been introduced through the foregoing amendments.

The unentered Substitute Specification filed on August 29, 2001 is resubmitted in both clean and marked-up copies. A new Abstract is also enclosed. Applicants respectfully submit that the Substitute Specification and new Abstract do not contain new matter. Entry of the Substitute Specification and new Abstract is believed appropriate and therefore courteously solicited.

The objection to the drawings under *37 CFR 1.83(a)* is noted. Applicants have removed the claim wording being objected to from claim 12. The feature of amended claim 12 is clearly shown at 18 in Fig. 6 of the original application. Accordingly, Applicants respectfully request that the objection to the drawings under *37 CFR 1.83(a)* has been overcome.

The objections to the drawings under *37 CFR 1.84(p)* are noted. These objections are believed overcome in light of the resubmitted Substitute Specification.

The objection to the Amendment filed August 29, 2001 for introducing new matter into the disclosure is noted. The Examiner alleged that the following added material is not supported by the original disclosure: (i) a depth of at least one of the grooves gradually decreases from the longitudinally middle point of the respective line toward the longitudinally opposite ends thereof (claim 17), and (ii) at least one of the side regions of said core has a thickness gradually decreasing toward the respective transversely opposite side of said core (claim 21). Applicants respectfully traverse because the former feature finds support in the original specification, last 4 lines of the first

paragraph on page 8, and the latter feature finds support in the original drawings e.g. element 4 Fig. 6. Please also note that the latter feature has been further clarified through amendments to claim 21. The new matter objection is therefore inappropriate and should be withdrawn.

The objection to the disclosure for containing informalities is believed overcome in light of the resubmitted Substitute Specification.

The Examiner's withdrawal of previous art rejections in favor of newly cited and applied U.S. Patent No. 5,817,271 to Congleton is noted. The new reference, however, does not come any closer to the claimed invention than the previously applied and now withdrawn art.

More particularly, Congleton is related to functional absorbent materials that are profiled through cutting and heating using lasers. As can be seen in the front page of the Congleton patent, lasers 30 are used to vaporize certain portions of top surface 22 of absorbent pad 20 to form channels 40. Simultaneously, lasers 30 locally raise the temperature in the vicinity of channels 40 causing finite **expansion** of the absorbent material and formation of bellows 45.

It is common knowledge that when a material expands its density decreases. Thus, the material density of "expanded" bellows 45 must be lower than that of the remaining parts of the core which are unaffected by the laser. Thus, density of the core portions under channels 40 must be higher than that of bellows 45. In other words, the Congleton core has a **higher** material density in "indented regions" 40 than in "central and side regions" 45. This structure is completely opposite to the claimed invention which requires that the core have a **lower** material density in indented regions than in central and side regions. *See* last 2 lines of amended independent claim 6.

Accordingly, Applicants respectfully submit that Congleton fails to anticipate or render obvious the claimed invention. The *35 U.S.C. 102(e)* and *35 U.S.C. 103(a)* rejections relying on Congleton are therefore erroneous and should be withdrawn.

Furthermore, the Examiner's *35 U.S.C. 103(a)* rejection of claims 8, 10-11 and 13-21 is absolutely improper because the Examiner has not met the burden of establishing a prima facie case of obviousness. MPEP in section 706.02(j) states that the examiner should set forth in the Office action:

(A) the relevant teachings of the prior art relied upon, preferably with reference to the relevant column or page number(s) and line number(s) where appropriate,

(B) the difference or differences in the claim over the applied reference(s),

(C) the proposed modification of the applied reference(s) necessary to arrive at the claimed subject matter, and

(D) an explanation why one of ordinary skill in the art at the time the invention was made would have been motivated to make the proposed modification.

Applicants respectfully submit that the Examiner fails to follow the above mandate steps in her *35 U.S.C. 103(a)* rejection indicated in page 6 of the Office Action. Applicants further submit that the Examiner also fails to provide adequate suggestions or motivations to modify the Congleton reference to arrive at the claimed invention.

More particularly, the Examiner seemed to state that the claimed invention is obvious over Congleton because the incorporation of limitations such as discontinuous lines and their arrangement, among other things, would not allow the claimed invention to function any differently from Congleton. This is not a proper statement of suggestion or motivation to modify the applied reference.

First, the Examiner fails to specify where the so-called suggestion or motivation might be found i.e. in the reference itself or in the knowledge generally available in the art. *See* MPEP 706.02(j).

Second, Applicants respectfully submit that Congleton teaches only continuous lines and does not disclose, teach or suggest the claimed discontinued lines.

Third, if it is the Examiner's intention to rely on the knowledge generally available in the art, convincing evidence in form of exact citations of a reference or references that might support the Examiner alleged suggestion or motivation to modify Congleton is respectfully requested.

The Examiner further seemed to state that it would have been obvious to experiment with the intended regions of Congleton to discover the claimed features since it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. This statement is not understood.

First, the Examiner did not specify which "general conditions" are disclosed in the prior art and how the disclosed "general conditions" relate to each rejected claim.

Second, the Examiner seems to rely on *In re Aller*, 220 F.2d 454 (CCPA 1955) for the "optimum or workable range discovery" argument. It should be noted that the examiner may use the rationale used by the court if the facts in the prior legal decision are sufficiently similar to those in an application under examination. *See* MPEP 2144.04. The Examiner fails to parallel the fact patterns in the instant case and *In re Aller* and therefore Applicants are not persuaded that the holding of *In re Aller* may be applicable in this case.

Third, there are numerous exceptions to *In re Aller* e.g. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) discussed in MPEP section 2144.05. II. B. The court in *In re Antonie* stated that "a particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." *Id* (emphasis added). In this particular case, the Examiner has produced no evidence to prove that the relevant teachings of

Congleton could be considered as result-effective variable(s). Accordingly, *In re Aller* is inapplicable in this case.

Finally, it should be noted that since a prima facie case of obviousness has not been established by the Examiner, the burden has not been shifted to Applicants to come forward with evidence and or argumentation to rebut the Examiner rejection. It is, however, Applicants' intention that evidence showing unexpected results associated with one or more limitations of the rejected claims may be submitted once a prima facie case of obviousness has been properly established by the Examiner.

Each of the Examiner's rejections has been traversed. Accordingly, Applicants respectfully submit that all claims are now in condition for allowance. Early and favorable indication of allowance is courteously solicited.

The Examiner is invited to telephone the undersigned, Applicant's attorney of record, to facilitate advancement of the present application.

Respectfully submitted,

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MARKED-UP VERSION SHOWING CHANGES MADE

IN THE CLAIMS:

Please amend the claims as follows:

6. (Amended) An absorbent article, comprising:

a liquid-permeable topsheet; and

a liquid-absorbent core having an upper surface covered by said topsheet and a lower surface, said core further having indented regions arranged along two lines extending longitudinally along transversely opposite sides of said core, said lines spaced apart from each other by a distance gradually increasing from a minimum at a longitudinally middle point thereof to a maximum at longitudinally opposite ends thereof, the indented regions longitudinally dividing said core into a central region confined between the indented regions and two side regions each located between one of the indented regions and the respective one of the transversely opposite sides of said core;

wherein said core contains a fibrous component and a density of the fibrous component in the indented regions is [equal to or] lower than in the central and side regions.

12. (Amended) The article of claim 11, wherein a distance between the side walls [are tapered] decreases from the opening toward the bottom.

13. (Amended) The article of claim 11, wherein the openings of the indentations arranged successively along each of said lines are spaced from each other.

21. (Amended) The article of claim 6, wherein at least one of the side regions of said core has a thickness gradually decreasing from the respective intended region toward the respective one of the transversely opposite sides of said core.

MARKED-UP VERSION SHOWING CHANGES

DISPOSABLE BODY FLUIDS ABSORBENT ARTICLE HAVING LONGITUDINAL SIDE GROOVE

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a disposable body fluids absorbent article such as a disposable diaper, a sanitary napkin or the like.

Japanese Utility Model Application Disclosure Gazette (Kokai) No. Hei1-141707, Japanese Utility Model Application Disclosure Gazette (Kokai) No. Hei2-84623 and Japanese Patent Application Disclosure Gazette (Kokai) No. Hei9-51913 disclose a disposable diaper including grooves ~~each~~ extending through a thickness of a liquid-absorbent core ~~in the direction of its thickness~~ or grooves dividing the liquid-absorbent core in a plurality of sections in the transverse direction of the absorbent core. Along these grooves, a topsheet and a backsheet of the diaper are bonded to each other ~~and thereby~~ to define bottoms of the respective grooves.

Japanese Utility Model Application Publication (Kokoku) No. Hei5-39691 and Japanese Patent Application Disclosure Gazette (Kokai) No. Hei9-108262 disclose a sanitary napkin having a liquid-absorbent core compressed in the direction from a topsheet toward a backsheet or in the reverse direction to form grooves extending in the longitudinal

direction of the napkin. The liquid-absorbent core presents a remarkably high density along bottoms of the grooves.

In ~~of~~ the prior art ~~as has been~~ described above, ~~the case in which~~ the topsheet and the backsheet are bonded to each other to define the bottoms of the respective grooves, ~~can not free from any apprehension that~~ an amount of body fluids ~~flowing~~ into the grooves might stay and give a wearer of the article, such as a diaper, a feeling of wetness ~~due to which~~ the wearer's discomfort ~~increases~~. ~~This is for~~ The reason is that the liquid-absorbent core of a disposable diaper or a sanitary napkin generally has a limited thickness and the side walls of the grooves are correspondingly limited in a total surface area even if the grooves are intended to absorb the amount of body fluids flowing ~~into them~~.

Fig. 7 is a sectional view showing ~~the~~ napkin 101 described in the Japanese Utility Model Application Publication Gazette (Kokoku) No. Hei5-39691 ~~taken in the transverse direction of the napkin 101~~. ~~It is possible for the case of~~ The napkin 101 ~~to~~ solves the problem, ~~that an amount of~~ body fluids ~~may stay~~ in ~~the~~ grooves 102 ~~since the~~ liquid-absorbent core 104 ~~underlies the~~ bottoms 103 of the respective grooves 102. However, the ~~regions~~ of the liquid-absorbent core 104 immediately underlying the bottoms 103

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have been compressed to have relatively high density and rigidity of the core 104 is correspondingly high in these portions ~~regions~~. To alleviate an adverse effect of the relatively high density, ~~a measure has generally been adopted such that the~~ opposite side walls 106 of the respective grooves 102 are tapered toward the bottoms 103 to ~~describe~~ define a U- or V-shape ~~in the~~ section of the liquid-absorbent core 104 in the vicinity of each groove 102.

The napkin 101 of Fig. 7 formed on both side regions with such grooves 102 can not smoothly placed against a crotch region of the wearer with the napkin ~~1~~ 101 being curved over its full width substantially in an inverted U-shape. ~~On the contrary to~~ In an inverted embodiment of the napkin 101 of Fig. 7, the napkin may be formed on its both side regions with ~~the~~ grooves by compressing the napkin from the backsheet toward the topsheet to facilitate the napkin to crook or curve over its full width substantially in an inverted U-shape. However, there is still an apprehension that the bottoms of the respective inverted grooves, having a relatively high rigidity, might directly stimulate soft skin ~~of~~ in the wearer's crotch region. In addition, it is impossible for such a napkin to offer the desired function and effect of preventing ~~any amount of menstrual discharge~~ body fluid from leaking sideways by receiving and absorbing

an the body fluids,
~~the~~ amount of ~~menstrual discharge~~ flowing on the topsheet transversely of the napkin, in the grooves.

SUMMARY OF THE INVENTION

above
In view of the problem ~~as has been described above~~, it is a principal object of this invention to provide an improved ~~a~~ disposable article, such as a sanitary napkin, which is easy
~~facilitating the article~~ to curve over its full width with the topsheet facing a crotch region of a wearer ~~defining the outside and eliminating an apprehension that the napkin curved in this manner might~~ without ing stimulate the wearer's skin.

According to the present invention, there is provided a disposable body fluids absorbent article adapted to be placed against a crotch region of a wearer to absorb body fluids, comprising a liquid-absorbent core ~~configured substantially in a narrow rectangle longitudinally oriented along the crotch region and~~ having an upper surface covered with a liquid-pervious topsheet and a lower surface, and the liquid-absorbent core being provided in the vicinity of opposite side edges extending in a longitudinal direction thereof with depressed regions tapering from the upper surface toward the lower surface and ~~lying~~ along a pair of imaginary lines extending in the longitudinal direction so as

to describe convex curves respectively facing a center line bisecting a width of the liquid-absorbent core.

According to one embodiment of the present invention, the depressed regions continuously extend along the imaginary lines.

According to another embodiment of the present invention, the depressed regions intermittently extend along the imaginary lines.

According to still another embodiment of the present invention, the liquid-absorbent core contains a fibrous component and a density of the fibrous component in the depressed regions is equal to or lower than a density of the fibrous component in the remaining region.

According to further another embodiment of the present invention, the liquid-absorbent core further contains superabsorptive polymer particles distributed only in a region defined inside the imaginary lines about the center line.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective partially exploded view showing a ~~partially cutaway~~ sanitary napkin constructed according to the present invention;

Fig. 2 is a sectional view taken along a line II-II in Fig. 1;

Fig. 3 is a view similar to Fig. 2 showing the sanitary napkin as it is put on a wearer's body;

Fig. 4 is a view similar to Fig. 1 showing a sanitary napkin according to one embodiment of the present invention;

Fig. 5 is a view similar to Fig. 1 showing a sanitary napkin according to another embodiment of the present invention;

Fig. 6 is a view similar to Fig. 2 showing a sanitary napkin according to still another embodiment of the present invention; and

Fig. 7 illustrates a typical napkin ~~of~~ prior art in its transverse section.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Details of a disposable body fluids absorbent article according to the present invention will be more fully understood from the description given hereunder with reference to the accompanying drawings which illustrate specific embodiments of the sanitary napkin ~~as a specific embodiment~~ of the present invention.

A sanitary napkin 1 shown ~~by~~ in Fig. 1 ~~in a partially~~

~~cutaway perspective view~~ comprises a liquid-pervious topsheet 2, a liquid-impervious backsheet 3 and a liquid-absorbent core 4 disposed between the topsheet 2 and the backsheet 3. The topsheet 2 and the backsheet 3 extend outward beyond a peripheral edge of the liquid-absorbent core 4 and are put flat and bonded together along the extension.

The napkin 1 is substantially configured ~~in~~ as a narrow rectangle defined by opposite side edges 6 extending in a longitudinal direction and opposite ends 7 extending in a transverse direction. The liquid-absorbent core 4 is also configured ~~in~~ as a narrow rectangle defined by opposite side regions 11 and opposite end regions 12. The core 4 has an ~~of which the~~ upper surface 16 ~~is~~ covered with the topsheet 2 and ~~the~~ a lower surface 17 ~~is~~ covered with the backsheet 3. The upper surface 16 is formed with a pair of first grooves 18 extending along a pair of imaginary lines, for example, lines A-A as seen in Fig. 1, describing convex curves respectively facing a center line C-C bisecting a width of the napkin 1. The topsheet 2 is formed with a pair of second grooves 19 depressed and curved in coincidence with the ~~pair of~~ first grooves 18. The minimum dimension W by which the pair of first grooves 18 are spaced from each other transversely of the napkin 1 is preferably in a range of 20 - 40 mm.

Fig. 2 is a sectional view taken along a line II-II bisecting a length of the napkin 1. The liquid-absorbent core 4 may have a thickness gradually decreasing from ~~its~~ a ~~tranoversely~~ middle region toward the opposite side edges of the napkin 1, or ~~may have~~ a substantially uniform thickness except the regions defined by bottoms 21 of the first grooves 18 in which the thickness of the core 4 is abruptly decreased. Specifically, the thickness of the core 4 is approximately 1 ~ 15 mm in the ~~tranoversely~~ middle region and 10 - 80 % thereof in the regions defined by the bottoms ~~19~~ 21. Each of the first grooves 18 has a width ~~W~~ X of approximately 1 - 10 mm at its open top from which the first groove 18 is tapered toward its bottom 21. A depth of the first groove 18 gradually decreases from its longitudinally middle region toward its longitudinally opposite ends until the groove 18 disappears.

The liquid-absorbent core 4 comprises hydrophilic fibers such as fluff pulp or hydrophobic fibers treated to become hydrophilic of 100 ~ 40 % by weight, superabsorptive polymer particles of 0 ~ 60 % by weight and hydrophobic fibers of 0 - 20 % by weight. The core 4 has a remarkably low rigidity at the respective bottoms 21 of the first grooves 18 due to particular thickness and composition in

these regions. A fiber density in the regions defined by the bottoms 21 is equal to or lower than that in the remaining region and an amount of the polymer particles in the regions defined by the bottoms 21 is equal to or less than that in the remaining region. More preferably, the polymer particles are distributed only in the region extending from the respective imaginary lines A-A to the center line C-C of the core 4 and not distributed in the regions defined by the bottoms 21. By distributing the polymer particles in this manner, it is possible to avoid an apprehension that the polymer particles might absorb a partial amount of ~~menstrual discharge~~ body fluids and consequently form gel blocks. Such gel blocks might obstruct a smooth movement of ~~menstrual discharge~~ the body fluids in the transverse direction of the core 4. It is ~~not~~ neither SIET apprehended ~~also~~ that the first grooves 18 might be filled up with ~~the~~ polymer particles swollen by absorption of ~~menstrual discharge~~ the body fluids.

The topsheet 2 is made of a liquid-pervious nonwoven fabric or a porous plastic film and may be intermittently bonded to the upper surface 16 of the core 4, if desired. The backsheet 3 is made of a liquid-impervious plastic film and may be intermittently bonded to the lower surface 17 of the core 4, if desired. The backsheet 3 is applied on its

lower surface with adhesive 23 by which the napkin 1 is attached ~~fastened~~ to an undergarment worn by a wearer and the adhesive 23 is covered with a release paper 24.

Fig. 3 is a view similar to Fig. 2 showing the napkin 1 as put on the wearer's body. The napkin 1 is ~~fastened~~ attached by means of the adhesive 23 to the inner surface of the undergarment ~~24~~ 26 on a crotch region thereof and placed against a crotch region 27 of the wearer. As seen in Fig. 3, the napkin 1 is put on the wearer's body so that the napkin describes an inverted U-shape with the topsheet 2 defining the outer side thereof. With the napkin 1 according to the present invention, the opposite side regions 11 of the core 4 easily crook or curve downward along the first grooves 18 having a relatively low density and thereby ensuring good ~~fitting~~ to the wearer's crotch region without giving the wearer any feeling of incompatibility. Along the first grooves 18, ~~the~~ an amount of ~~menstrual discharge~~ body fluids flowing thereinto can be absorbed by the core 4 through the topsheet 2 on opposite side walls 28 as well as on the bottoms 21 of the first grooves 18.

Fig. 4 is a view similar to Fig. 1 showing one embodiment of the present invention. According to the embodiment, the core 4 of the napkin 1 is formed with a

plurality of first depressions 28 intermittently arranged along the pair of imaginary lines A-A and the topsheet 2 is formed with a plurality of second depressions 29 arranged in close contact with the first depressions 28, respectively. The first and second depressions 28, 29 replace the first and second grooves 18, 19 in Fig. 1. The individual depressions are shaped to be circular or oval. Each of the first depressions 28 has a dimension substantially corresponding to the dimension of the first groove 18 as measured transversely of the napkin 1 and has a depth which is also substantially corresponding to the depth of the first groove 18.

Fig. 5 is a view similar to Fig. 1 showing a napkin according to another embodiment of the present invention. Similarly to ~~the case as has been described in reference with~~ this Fig. 1, the napkin 1 according to ~~the~~ embodiment has a pair of first grooves 18 and the corresponding pair of second grooves 19 extending transversely of the napkin 1. The is embodiment differs from ~~the case of~~ Fig. 1 in that the grooves 18, 19 formed on both sides of the napkin 1 come in contact on the center line C-C so that the grooves 18, 19 on both sides describe together a curved X-shape. In other words, the first and second grooves 18, 19 extend transversely of the napkin 1 along a pair of imaginary curves

A-A which are convex toward the center line C-C.

Fig. 6 is a view similar to Fig. 2 showing a napkin 1 according to still another embodiment of the present invention. The napkin 1 differs from the precedent embodiments in that the topsheet 2 is not formed with the pair of second grooves 19 to be aligned with the pair of first grooves 18 formed, also in the case of the napkin 1, on the core 4 and merely covers the respective open tops of the first grooves 18. The napkin 1 according to the embodiment also is easily deformable in the inverted U-shape as the napkin 1 is put on the wearer's body. However, it is apprehended that the napkin 1 might be less reliable than the napkin 1 of Fig. 1 in its function and effect to prevent the partial amount of menstrual discharge flowing on the topsheet 2 transversely of the napkin 1 from leaking sideways by receiving such amount of menstrual discharge in the pair of second grooves 19 and absorbing this through the bottoms as well as through the opposite side walls of the second grooves 19.

While the present invention has been described hereinabove by way of example in the form of sanitary napkin 1, it should be understood that the present invention is not limited to the sanitary napkin and applicable also to the

other various disposable garments such as disposable diaper and disposable undergarment particularly for persons suffering from incontinence.

The disposable body fluids absorbent article according to the present invention is provided on both sides of the liquid-absorbent core with the depressions tapering from the upper surface toward the lower surface of the liquid-absorbent core so that the body fluids may be absorbed through the bottoms as well as through the opposite side walls of these depressions. This unique arrangement is effective to avoid an apprehension that the body fluids might stay in these depressions and give the garment wearer undesirable feeling of high wetness and discomfort due to such feeling of high wetness. Furthermore, a rigidity of the liquid-absorbent core is remarkably lower along the bottoms of the respective depressions than in the vicinity thereof. Such unique distribution of the rigidity facilitates the liquid-absorbent core to crook or curve along the depressions over a full width of the core substantially in the inverted U-shape as the napkin is put on the wearer's body.